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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/799,147

03/12/2004

Laurent Vandroux

AMAT/8390/DSM/BCVD/JW

7931

44257

7590

07/29/2005

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EXAMINER

KIANNI, KAVEH C

ART UNIT

PAPER NUMBER

2883

DATE MAILED: 07/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/799,147	VANDROUX ET AL.	
	Examiner	Art Unit	
	Kianni C. Kaveh	2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 11-18 and 22 is/are rejected.
- 7) ☒ Claim(s) 7-10 and 19-21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.



Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 16 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 17 recites the limitation "the fill material" in the 1st line. There is insufficient antecedent basis for this limitation in the claim. Correction is required.

Claims 16-17 are ambiguous as to whether the fill material is the amorphous hard mask material or it is a different material disposed on the core; further, there is no such "fill material" any where in the specification. Correction(s) is/are required.

Allowable Subject Matter

Claims 7-10 and 19-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 7-9 and 19-21 are allowable because the prior art of record, taken alone or in combination, fails to disclose or render obvious wherein depositing the amorphous silicon hardmask comprises: introducing into a processing chamber one or more

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hydrocarbon compounds having the general formula C_xH_y , wherein x has a range of 2 to 4 and y has a range of 2 to 10; and generating a plasma of the one or more hydrocarbon compounds in combination with the rest of the limitations of the base claim.

Claim 10 is allowable because the prior art of record, taken alone or in combination, fails to disclose or render obvious wherein the etch selectivity of amorphous carbon to the core material is between about 1:8 and about 1:15 in combination with the rest of the limitations of the base claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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Claim 1-6 and 11-18 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over combination of Lackritz et al. (US 20040046963) and Savas et al. (US 20050112883).

Regarding claims 1-2, 11, and 22 Lackritz teaches a method for forming a waveguide structure on a substrate surface (shown in at least fig. 7), comprising: forming a first cladding layer on the substrate surface (see parag. 0092); forming a core layer on the first cladding layer (see parag. 0092-0093); depositing an amorphous silicon hardmask on the core layer (see parag. 0094); forming a patterned photoresist layer on the amorphous silicon hardmask ; etching the amorphous silicon hardmask (see parag. 0094); etching the core material (see parag. 0094); removing the amorphous silicon hardmask (see parag. 0094); and forming a second cladding over the exposed core material (see parag.0094-0095).

However Lackritz does not specifically teach wherein the above amorphous silicon is an amorphous carbon and that wherein removing the amorphous silicon hardmask comprises exposing the amorphous silicon hardmask to a plasma of a hydrogen containing gas or an oxygen containing gas. Nevertheless, Lackritz states that any type of hard mask can be employed as means for forming waveguide structures (see parag. 0084). The above limitations are more specifically taught by Savas et al. (see at least abstract and parag. 0037). Thus, Savas provides improved process for removing residues/photoresist/sacrificial layer (see parag. 0012). Thus, it would have been obvious to a person of ordinary skill in the art when the invention was made to modify Lackritz method of employing amorphous silicon hardmask with that of a conventional

amorphous carbon hardmask taught by Savas in order to produce an optical waveguide that includes the above limitation since such material would improve management of light propagated in optical systems(see parag. 0002).

Regarding claims 3-6 and 12-18, as stated in rejection of claims 1 and 11, above, Lackritz further teaches wherein the first and/or second cladding layer comprises a material having a refractive index lower than the refractive index of the core material (see parag. 0111; also wherein the refractive index of core to be higher than that of cladding layer(s) is extremely conventional); wherein the first cladding layer comprises a material selected from the group of undoped silicon dioxide, thermal-oxides, or silicon dioxide doped with boron, phosphorous, and combinations thereof (see at least parag. 0092, and 0095; also such material are conventional used in the core/cladding and have no bearing in the implementation of the invention), and the core material comprises a light propagating channel selected from the group of germanium doped silicon dioxide, germanium boron doped silicon dioxide silicon-germanium compositions, phosphorous doped silicon dioxide, silicon oxynitride, silicon nitride, silicon, and combinations thereof (see at least parag. 0093 and 0111; also such material are conventional used in the core/cladding and have no bearing in the implementation of the invention); wherein the second cladding material comprises the first cladding material (see at least parag. 0095); wherein the second cladding layer comprises a material selected from the group consisting of quartz, silicon oxide, fused silicon oxide, and combinations thereof (see at

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least parag. 0111; wherein glass(es) is of silicon dioxide and/or quartz; and also such material are conventional used in the core/cladding and have no bearing in the implementation of the invention); depositing a fill layer; and planarizing the fill layer to expose the core material prior to forming a second cladding over the exposed core material (see at least parag. 0094); wherein the fill material comprises a material having a refractive index lower than the refractive index of the core material (see parag. 0093-0094; wherein silicon material has lower refractive index than that of a high refractive index core which is of silicondioxide/galss/sio₂; wherein such material(s) are used as sacrificial layer which is analogously used as that of applicant's claimed invention);

Citation of Relevant Prior Art

Prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In accordance with MPEP 707.05 the following references are pertinent in rejection of this application since they provide substantially the same information disclosure as this patent does. These references are:

Bencher 6852647	teaches amorphous carbon based hardmask
Friedmann et al. 6103305	teaches amorphous carbon based hardmask
Kurihara 5246198	teaches amorphous carbon based hardmask
Won 20030041624	teaches at least independent claims
Won 6732550	teaches at least independent claims
Ticknor et al. 20030012483	teaches at least independent claims
Bazylenko et al. 6154585	teaches at least claim 1
Vacca et al. 20030006140	

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These references are cited herein to show the relevance of the apparatus/methods taught within these references as prior art.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to K. Cyrus Kianni whose telephone number is (571) 272-2417.

The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 6:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font, can be reached at (571) 272-2415.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9306 (for formal communications intended for entry)

or:

Hand delivered responses should be brought to Crystal Plaza 4, 2021 South Clark Place, Arlington, VA., Fourth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0956.


K. Cyrus Kianni
Primary Patent Examiner
Group Art Unit 2883

**KAVEH KIANNI
PRIMARY EXAMINER**

July 26, 2005